

What Is Claimed Is:

1 1. A system comprising:  
2 a process chamber having a feed inlet, a  
3 low pressure outlet and a high pressure outlet;  
4 a feed pump;  
5 a common shaft having rotatably coupled  
6 thereto a booster pump fluidically coupled between  
7 said feed pump and said feed inlet and an energy  
8 recovery turbine fluidically coupled to said high  
9 pressure outlet through a first channel, said energy  
10 recovery turbine drives said booster pump; and  
11 a second channel fluidically coupling said  
12 process chamber and said high pressure outlet.

1 2. A system as recited in claim 1 wherein  
2 said process chamber has a first reverse osmosis  
3 membrane therein.

1 3. A system as recited in claim 1 wherein  
2 said low pressure outlet comprises a permeate outlet.

1 4. A system as recited in claim 1 wherein  
2 said high pressure outlet comprises a concentrate  
3 outlet.

1 5. A system as recited in claim 1 further  
2 comprising a first control valve coupled between said  
3 booster pump and said feed pump.

1 6. A system as recited in claim 1 further  
2 comprising a second control valve coupled within said

3 second channel and directing concentrate between said  
4 feed pump and said booster pump.

1 7. A system as recited in claim 1 further  
2 comprising a jet pump fluidically coupled to the  
3 second channel to couple the high pressure outlet to  
4 said feed pump outlet.

1 8. A system as recited in claim 7 wherein  
2 said jet pump <sup>142</sup> is coupled between said feed pump and  
3 said booster pump.

1 9. A system as recited in claim 8 wherein  
2 said jet pump is coupled between said booster pump  
3 and said process chamber.

1 10. A reverse osmosis system comprising:  
2 a reverse osmosis process chamber having a  
3 first feed inlet, a first permeate outlet and a first  
4 concentrate outlet;  
5 a feed pump;  
6 a common shaft having rotatably coupled  
7 thereto a booster pump fluidically coupled between  
8 said feed pump and said first feed inlet and an  
9 energy recovery turbine fluidically coupled to said  
10 first concentrate outlet through a first channel,  
11 said energy recovery turbine driving said booster  
12 pump; and

13 a second channel coupled to said first  
14 concentrate outlet for directing a portion of said  
15 concentrate between said booster pump and said feed  
16 inlet.

1 11. A system as recited in claim 10  
2 wherein said second channel directs concentrate  
3 between said feed pump and said energy recovery  
4 turbine.

1 12. A system as recited in claim 10  
2 wherein said second channel directs said concentrate  
3 between said energy recovery turbine and said process  
4 chamber.

1 13. A system as recited in claim 10  
2 further comprising a jet pump coupling said second  
3 channel to said feed pump outlet.

1 14. A system as recited in claim 13  
2 wherein said jet pump is coupled between said feed  
3 pump and said booster pump.

1 15. A system as recited in claim 13  
2 wherein said jet pump is coupled between said booster  
3 pump and said process chamber.

1 16. A method of operating a process having  
2 a feed pump directing fluid to a process chamber  
3 having a high pressure outlet and a low pressure  
4 outlet comprising the steps of:

5 boosting a pressure of fluid output from a  
6 feed pump prior to entering to a first process  
7 chamber (using) from a first portion of a high pressure  
8 fluid from a high pressure outlet of a first process  
9 chamber;

10 recirculating a second portion of the high  
11 pressure fluid; and

12 fluidically coupling the second portion of  
13 the high pressure fluid between the feed pump and the  
14 process chamber.

1 17. A method as recited in claim 16  
2 further comprising the steps of providing first  
3 energy recovery turbine coupled to a booster pump to  
4 preform the step of boosting.

1 18. A method as recited in claim 16  
2 further comprising the steps of providing a jet pump  
3 to preform the step of fluidically coupling.

1 19. A method as recited in claim 16  
2 further comprising the steps of fluidically coupling  
3 a pumped fluid input of the jet pump to the second  
4 portion of high pressure fluid and fluidically  
5 coupling a driving fluid input to fluid output from  
6 the feed pump.

1 20. A method as recited in claim 16  
2 further comprising the steps of fluidically coupling  
3 a pumped fluid input of the jet pump to fluid output  
4 from the feed pump and fluidically coupling a driving  
5 fluid input to the second portion of high pressure  
6 fluid.